

REMARKS

This amendment is submitted in response to the Final Office Action dated June 4, 2002. A petition for a three month extension of time and a Request for Continued Examination (RCE) application is submitted herewith.

Claim 1 is amended to more particularly point out and distinctively claim the invention. Claim 9 is cancelled. Claim 1 is amended to recite that the wafer carrier is comprised substantially of a material selected from the group of silicon carbide, aluminum nitride, large-grained polycrystalline silicon and silicon/silicon carbide alloy. Support for this amendment is found in the specification, for example at page 7, and in original claim 9.

The Examiner rejects claims 1, 3, 4, 6, 8, 10 and 11 under 35 U.S.C Section 103(a) as unpatentable over McDiarmid, US patent no. 5, 242, 501; and claims 1-4, 6, 8, 10 and 11 under 35 U.S.C Section 103(a) as unpatentable over MacLeish. Applicant respectfully traverses these rejections and submits that the claims as amended are patentable over the cited art.

Claim 1 is amended to recite the limitation that the wafer carrier is comprised substantially of a material selected from the group of silicon carbide, aluminum nitride, large-grained polycrystalline silicon and silicon/silicon carbide alloy.

When rejecting claims under 35 U.S.C. §103, the Examiner bears the burden of establishing a prima facie case of obviousness. See, e.g., *In re Bell*, 26 USPQ2d 1529 (Fed. Cir. 1993); M.P.E.P. §2142. To establish a prima facie case, three basic criteria must be met: (1) the prior art must provide one of ordinary skill with a suggestion or motivation to modify or combine the teachings of the references relied upon by the Examiner to arrive at the claimed invention; (2) the prior art must provide one of ordinary skill with a reasonable expectation of success; and (3) the prior art, either alone or in combination, must teach or suggest each and every limitation of the rejected claims. The teaching or suggestion to make the claimed invention, as well as the reasonable expectation of success, must come from the prior art, not Applicant's disclosure. In *re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991); M.P.E.P. §706.02(j). If any one of these criteria is not met, prima facie obviousness is not established.

McDiarmid and MacLeish fail to teach or suggest each and every element of the claimed invention. The prior art references teach a susceptor made substantially of graphite, which does not meet the material limitation recited in amended Claim 1.

There is no motivation to modify MacLeish or McDiarmid, either separately or in combination, to arrive at the claimed invention. The wafer carriers of McDiarmid and

MacLeish are comprised substantially of graphite for an important reason - graphite acts as a conductor to couple RF heating to the wafer carrier. Substituting a material as recited in Applicant's claim 1 would defeat the intended purpose of the wafer carriers in McDiarmid and MacLeish, and thus there is no motivation to do so. Further, even if one were to combine McDiarmid and MacLeish, one would still not arrive at a wafer carrier substantially comprised of silicon carbide, aluminum nitride, large-grained polycrystalline silicon and silicon/silicon carbide alloy as recited in Applicant's claims.

Moreover, the selection of one material over another is not a simple, or obvious matter. The inventors have found that graphite, such as the graphite susceptors of the prior art, is not suited for the wafer carrier of the present invention, in part because the CVD processing environment employed in the present invention would readily oxidize a graphite susceptor. Additionally, the materials recited in claim 1 of the present invention are difficult to fabricate and manufacture, and are very expensive comparatively. Those in the field are not motivated to select such materials for fabrication of a wafer carrier.

The Examiner rejects claims 1, 8 and 9 under 35 U.S.C. §103(a) as unpatentable over Grabmaier in view of McDiarmid; and claims 1 and 9 under 35 U.S.C. §103(a) as unpatentable over Inoue in view of McDiarmid. Applicant respectfully traverse these rejections and submits that the claims as amended are patentable over the cited art.

Applicant respectfully submits that a change in shape is not a matter of choice which a person of ordinary skill in the art would have obvious, when such a change in shape is a complete departure from the prior art device and would destroy its intended purpose. Grabmaier is directed to a silicon rod support 1 for use in precipitating single crystalline layers from a gaseous silicon compound upon the rod support consisting of a single crystalline silicon. This is a very different application than that shown in McDiarmid, and Applicant cannot find motivation to combine the two as the Examiner suggests. As the wafers 2 to 7 appear to be directed supported by the rod support 1, the warping problem taught in McDiarmid – where the wafer is substantially suspended, does not appear to be an issue in Grabmaier. Even if one were to combine the references as the Examiner suggests, one would not arrive at Applicant's claimed invention.

Additionally, the material of the rod carrier in Grabmaier is comprised of crystalline silicon which has been highly purified by zone melting and exhibits at least one plane surface. Large grain polysilicon is very different, as well as are the other materials recited in Applicants' amended claims.

Inoue is directed to a round, flat wafer holder made of a blackened aluminum nitride based sintered body including Er_2O_3 as a sintering aid, so that the absorption characteristic of light of a certain wavelength emitted from halogen lamps can be raised in order to increase heat transfer to a wafer. The wafer appears supported directly by the wafer carrier, that is the wafer carrier contacts the entire backside of the wafer which appears to be required for uniform heating of the wafer. Inoue does not teach or suggest a wafer carrier comprised *substantially* of a material selected from the group of silicon carbide, aluminum nitride, large-grained polycrystalline silicon and silicon/silicon carbide *which enables the upwardly inclined surface to maintain contact substantially entirely around the peripheral edge of the substrate during processing at elevated temperatures such that deposition on the backside of the substrate is substantially prevented* as recited in Applicant's claims. Inoue does not teach or suggest the circular recessed center having a recessed bottom surface, but in contrast has a flat region and directly contacts the entire wafer.

Applicant respectfully submits that there is no motivation to combine the references on Inoue and McDiarmid as the Examiner suggests. Inoue does not appear to raise an issue of warping. Most importantly, if the wafer carrier of Inoue were to be modified to add the recess of McDiarmid as suggested by the Examiner, then the heat transfer to the wafer from the wafer carrier would be significantly changed. Inoue speaks of the importance of the wafer carrier absorbing light from the halogen lamps so that absorbed heat can be transferred to the whole of the wafer holding member to uniformly heat the wafer. Applicant respectfully submits that to modify the holder of Inoue as suggested by the Examiner would destroy its intended purpose.

The Examiner rejects claims 3, and 9 under 35 U.S.C. §103(a) as unpatentable in over MacLeish in view of Haafkens; and further under 35 U.S.C. §103(a) as unpatentable in over MacLeish in view of Chen. Applicant respectfully traverses this rejection and submits that the claims as amended are patentable over the cited references.


Both Haafkens and Chen show a carrier made of graphite with an aluminum nitride coating over the graphite. The wafer carriers of Haafkens and Chen are *not* substantially comprised of aluminum nitride, but are only coated with such. Applicants' amended claims require that the wafer carrier be comprised substantially of aluminum nitride (or the other materials recited). Haafkens and Chen do not teach or suggest this limitation. Moreover, if one were to combine Haafkens or Chen with MacLeish, one would still have a wafer carrier comprised substantially of graphite, and thus would not arrive at the present invention.

For the foregoing reasons, Applicant respectfully submits that the pending claims are novel and non-obvious over the cited references singularly or in combination. An early notice of allowance of all claims is respectfully requested.

If any matters can be handled by telephone, Applicant requests that the Examiner telephone Applicants' attorney at the number below. The Commissioner is authorized to charge any additional fees to Deposit Account No. 50-2319 (Order No. A-64873-1/MSS (463035-350)).

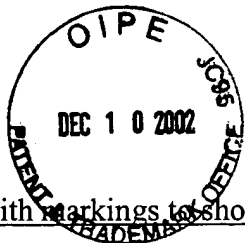
Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "Version with markings to show changes made."

Respectfully submitted,



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"Version with markings to show changes made"

1. (Amended) A wafer carrier for supporting a substrate, comprising:
a circular plate having a flat edge region extending around the circumference of said plate, said flat edge region having a width of approximately 5 to 25 mm; and
a circular recessed center region having a recessed bottom surface and including an upwardly inclined surface around the periphery of said recessed bottom surface,
wherein the substrate is supported by a portion of the upwardly inclined surface and is spaced apart from said recessed bottom surface, and the upwardly inclined surface is inclined at an angle in the range of approximately 5 to 45 degrees to the plane of the recessed bottom
wherein the substrate is supported by a portion of the upwardly inclined surface and is spaced apart from said recessed bottom surface, and the upwardly inclined surface is inclined at an angle in the range of approximately 5 to 45 degrees to the plane of the recessed bottom surface such that the substrate is supported by said wafer carrier only around a peripheral edge of the substrate and a backside of the substrate does not contact the recessed bottom surface, and
wherein said wafer carrier is comprised substantially of a material selected from the group of silicon carbide, aluminum nitride, large-grained polycrystalline silicon and silicon/silicon carbide alloy [having a coefficient of thermal expansion in the range of 2.6×10^{-6} to $5 \times 10^{-6} / ^\circ\text{C}$] which enables the upwardly inclined surface to maintain contact substantially entirely around the peripheral edge of the substrate during processing at elevated temperatures such that deposition on the backside of the substrate is substantially prevented.

Cancel Claim 9.

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